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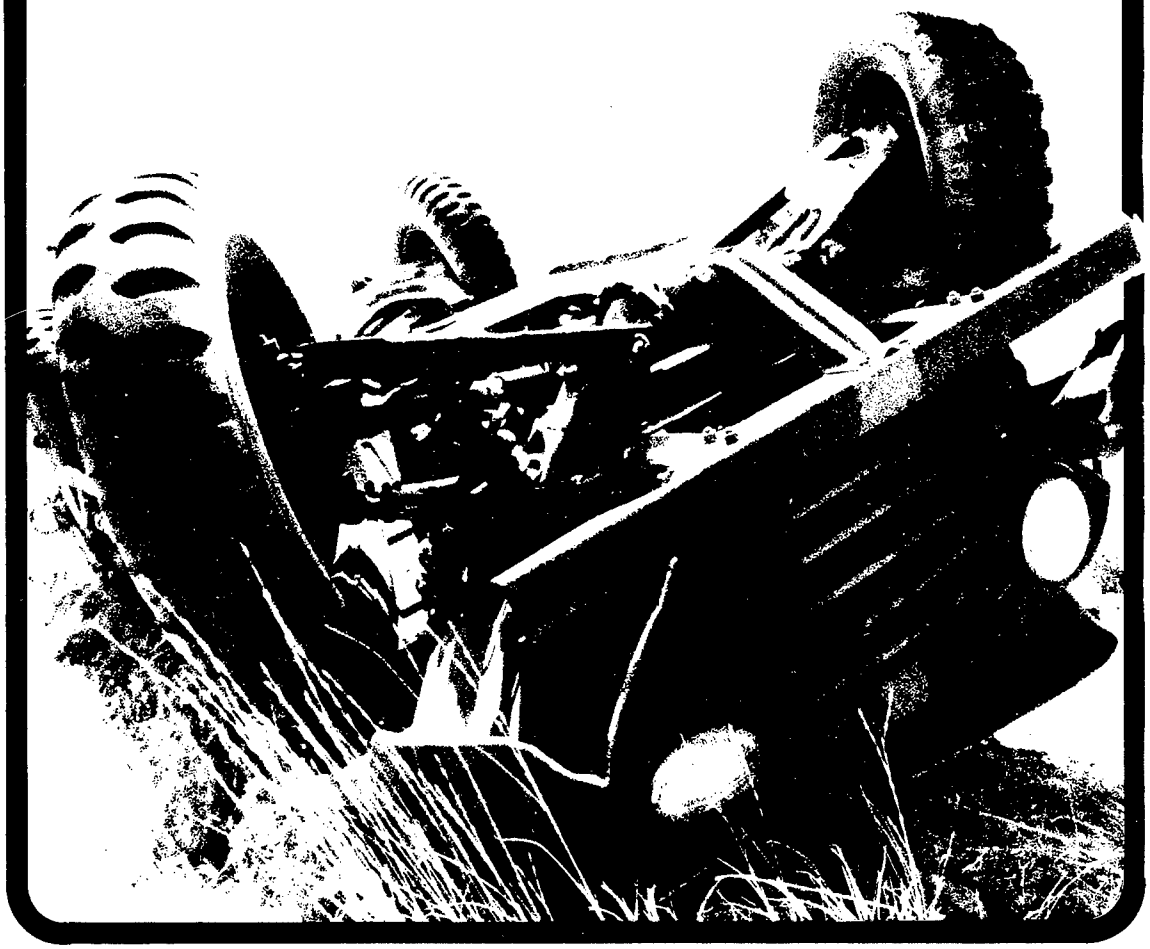
Major Ground Equipment System Accidents Caused by Materiel Failure



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Major Ground Equipment System Accidents Caused by Materiel Failure

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September 1985

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Major Ground Equipment System Accidents Caused by Materiel Failure

Summary

DA Form 285 accident reports for 3 fiscal years were analyzed to determine materiel failures/malfunctions affecting major ground equipment systems that caused/contributed to accidents. Major ground systems reviewed included Army motor vehicles and combat vehicles. The components most frequently involved in causing/contributing to accidents were brakes and wheels. Corrective actions included articles in *Countermeasure,* DA Forms 2028: Recommended Changes to Publications and Blank Forms, and recommendations to appropriate MACOM on materiel deficiencies.

Introduction

DA Form 285 accident reports were analyzed to determine materiel failures/malfunctions which caused/contributed to Army motor vehicle (AMV) and Army combat vehicle (ACV) accidents during 3 fiscal years.

Discussion

Army motor vehicle materiel failures/malfunctions.

Army motor vehicles most frequently reported as having materiel failures/malfunctions that caused/contributed to accidents were:

Tactical vehicles	Component most frequently involved
2½-ton trucks	brakes
5-ton trucks	brakes
M880/M890 trucks	wheels
¼-ton trucks	wheels and brakes
Commercial vehicles	**Component most frequently involved**
sedans/station wagons	brakes and wheels
¼- - ¾-ton trucks	wheels

Army combat vehicle materiel failures/malfunctions.

Army combat vehicles most frequently reported as having materiel failures/malfunctions that caused/contributed to accidents were:

Combat vehicles	Component most frequently involved
M113 carriers	hatch/door assemblies
other carriers	hatch/door assmeblies
M60 tanks	weapon system

TABLE 1.—Army Ground Accident (A-C) Materiel Failures for 3 Fiscal Years
Tactical Army Motor Vehicles

Type Vehicle	FY	Accidents	Injuries		Cost	Top Five Component Failures				
			Fatal	Nonfatal						
						Brakes	Wheels	Transmission	Fuel System	Frame
2½-ton trucks	81	79	3	23	546,771	52	13	2	3	3
	82	116	-	30	730,966	27	8	4	1	1
	83	72	-	20	916,635	20	2	1	1	-
						Brakes	Frame	Wheels	Fuel System	Steering
5-ton trucks	81	57	1	12	1,888,293	40	6	5	1	-
	82	73	-	11	293,466	18	4	1	1	1
	83	60	-	14	730,367	12	1	1	1	2
						Wheels	Brakes	Steering	Transmission	Electrical System
M880/M890 trucks	81	55	-	25	252,333	20	9	9	3	2
	82	50	-	22	429,042	10	4	3	2	1
	83	35	-	11	151,878	3	1	-	1	-
						Wheels	Brakes	Steering	Fuel System	Transmission
¼-ton trucks	81	44	-	32	217,675	17	9	4	3	1
	82	58	1	46	312,508	14	9	4	2	3
	83	33	3	23	423,376	3	8	3	-	-
						Brakes	Frame	Wheels	Electrical System	Body
Tactical trailer	81	22	-	2	93,771	11	4	2	2	-
	82	18	1	4	203,952	1	3	-	-	2
	83	13	-	3	89,610	1	-	1	-	-

TABLE 1.—Army Ground Accident (A-C) Materiel Failures for 3 Fiscal Years
Tactical Army Motor Vehicles—*Continued*

Type Vehicle	FY	Accidents	Injuries		Cost	Top Five Component Failures				
			Fatal	Nonfatal						
						Brakes	Electrical System	Wheels	Fuel System	Steering
Over 10-ton trucks	81	13	-	2	415,499	10	2	1	-	-
	82	19	-	5	303,568	8	1	-	1	1
	83	17	-	4	243,272	3	-	1	-	-
						Brakes	Steering	Transmission	Wheels	Electrical System
Gamma Goats	81	13	-	3	83,660	3	4	1	1	3
	82	19	-	7	38,536	2	-	2	1	-
	83	8	-	4	67,825	2	-	-	1	-
						Brakes	Wheels	Electrical System	Engine	Steering
8 & 10-ton trucks	81	8	-	4	30,546	5	1	-	-	-
	82	10	2	4	174,354	3	1	-	-	1
	83	16	3	7	339,656	4	-	2	1	-
						Brakes	Wheels	Door		
HET	81	1	-	2	875	1	-	-	-	-
	82	2	-	-	21,610	-	1	1	-	-
	83	3	-	1	108,040	1	1	-	-	-
						Brakes	Wheels	Frame	Steering	Transmission
Other tactical vehicles	81	48	-	8	103,132	16	9	7	2	2
	82	48	-	12	154,320	6	4	-	1	1
	83	41	-	11	195,909	5	1	1	2	-

TABLE 2.—Army Ground Accident (A-C) Materiel Failures for 3 Fiscal Years
Commercial Army Motor Vehicles

Type Vehicle	FY	Accidents	Injuries		Cost	Top Five Component Failures				
			Fatal	Nonfatal						
						Brakes	Wheels	Transmission	Electrical System	Engine
Sedan/Station wagon	81	24	-	-	35,865	9	5	3	1	2
	82	50	1	6	124,675	2	4	3	3	2
	83	22	-	6	64,665	3	2	1	-	-
						Wheels	Brakes	Doors	Steering	Electrical System
¼ - ¾-ton trucks	81	14	-	5	58,751	4	2	-	2	1
	82	17	-	6	43,546	5	2	2	-	-
	83	17	-	1	57,235	2	-	-	-	-
						Brakes	Wheels	Transmission	Body	Fuel
Van	81	12	-	1	14,355	2	3	3	2	-
	82	12	-	4	27,875	1	-	-	-	-
	83	9	-	2	17,867	-	-	-	-	1
						Brakes	Wheels	Body	Engine	Steering
Bus	81	9	-	1	17,230	7	-	2	-	-
	82	12	-	3	43,961	1	2	-	1	1
	83	6	-	1	13,630	-	-	-	-	-
						Brakes	Wheels	Electrical System	Fuel System	Transmission
Truck - over 2-ton	81	7	-	2	8,101	5	-	-	1	-
	82	13	-	4	56,035	1	3	1	-	-
	83	4	-	4	33,642	2	-	-	-	1

TABLE 2.—Army Ground Accident (A-C) Materiel Failures for 3 Fiscal Years
Commercial Army Motor Vehicles—*Continued*

Type Vehicle	FY	Accidents	Injuries		Cost	Top Five Component Failures				
			Fatal	Nonfatal		Brakes	Body	Doors	Wheels	
Truck Tractor	81	2	-	1	1,200	1	-	-	1	-
	82	11	-	3	43,961	2	-	1	-	-
	83	1	-	1	1,050	-	1	-	-	-
						Electrical System				
Trailer	81	2	-	-	3,032	2	-	-	-	-
	82	6	-	1	17,605	-	-	-	-	-
	83	1	-	-	1,500	-	-	-	-	-
						Wheels				
1 - 2-ton truck	81	1	-	-	1,202	-	-	-	-	-
	82	3	-	-	4,650	1	-	-	-	-
	83	2	-	1	3,240	1	-	-	-	-
						Trans-mission	Brakes	Doors	Electrical System	Fuel System
Other commercial vehicles	81	7	-	-	4,980	3	2	-	-	-
	82	21	-	2	36,701	-	1	1	2	-
	83	13	-	6	42,719	1	1	1	-	2

TABLE 3.—Army Ground Accident (A-C) Materiel Failures for 3 Fiscal Years
Army Combat Vehicles

Type Vehicle	FY	Accidents	Injuries		Cost	Top Five Component Failures				
			Fatal	Nonfatal						
						Hatches	Fuel System	Tracks	Air Flotation System	Steering
Other carrier	81	21	-	10	75,346	3	3	3	4	3
	82	25	1	14	396,682	8	1	2	2	-
	83	23	3	13	251,841	5	3	1	-	1
						Hatches	Tracks	Steering	Transmission	Brakes
M113 carrier	81	13	-	9	39,909	3	3	3	-	1
	82	25	1	16	197,476	5	3	1	2	1
	83	13	1	10	192,932	4	1	1	1	1
						Weapon System	Tracks	Electrical System	Brakes	Body/Cab/ Hood
M60 tank	81	15	-	8	92,043	4	4	1	2	-
	82	20	2	19	1,008,071	4	1	3	1	2
	83	9	-	4	1,238,935	2	-	1	1	1
						Frame	Hatches	Tracks	Brakes	Hoist
VTR	81	4	-	-	22,900	2	-	1	-	-
	82	8	-	1	42,744	1	1	1	1	-
	83	9	1	6	63,616	1	2	-	1	1
						Hatches	Weapon System	Electrical System	Brakes	Steering
M48 tank	81	4	-	4	14,860	-	-	-	1	2
	82	8	-	6	20,364	2	1	2	1	-
	83	5	-	4	33,726	-	1	-	-	-

TABLE 3.—Army Ground Accident (A-C) Materiel Failures for 3 Fiscal Years
Army Combat Vehicles—*Continued*

Type Vehicle	FY	Accidents	Injuries		Cost	Top Five Component Failures				
			Fatal	Nonfatal						
						Tracks	Steering	Body/Cab Hood	Weapon System	Brakes
SP Guns & Howitzers	81	6	-	8	9,530	1	-	1	1	1
	82	7	1	3	53,108	1	2	1	-	-
	83	1	-	1	240	-	-	-	-	-
						Hatches	Weapon System	Hoist	Electrical System	Steering
Other tank	81	3	-	1	4,173	1	-	-	1	-
	82	5	-	4	3,560	1	1	1	-	-
	83	6	-	2	5,279	-	1	1	-	1
						Brakes	Body/Cab Hood	Electrical System		
M1 tank	81	1	-	1	4,350	-	1	-		
	82	3	-	-	21,000	1	-	-		
	83	3	-	1	9,380	-	-	1		

TABLE 4.—Significant Materiel Failures by Army Motor Vehicle System for Class A, B, and C Ground Accidents for 3 Fiscal Years

No. of Occurrences	Failed Part	Corrective Action
99	2½-ton Truck Hydraulic System/Brakes	USASC conducted study of hydrovac brake failures. TACOM fielded a message informing users not to use copper tubing for brake lines. MWO fielded to change 2½-ton front wheel flex brake lines and followed up with a PS MAGAZINE article.
70	5-ton Truck Brakes	USASC conducted a study of brake system failures. TACOM directed all brake fluids used to be changed to a silicon base fluid. MACOM distribution of brake study to alert/inform commanders/ supervisors of identified problems with brake system problems ranging from inadequate PMCS to improper maintenance procedures.
34	¼-ton Truck Wheels	USASC conducted a study of wheel failures. A COUNTERMEASURE article is presently being written for publication. Primary cause factors were inadequate maintenance procedures and PMCS.
26	¼-ton Truck Brakes	USASC identified a lack of PMCS inspection requriements for the wheel cylinders and the possibility of mixing the ¾-inch wheel cylinder and the 1-inch wheel cylinder. TACOM developed a color code system to distinguish the two different wheel cylinders; published changes to the organizational maintenance manual requiring all wheels be removed during the semiannual inspection.
11	¼-ton Truck Steering	USASC identified a problem with the steering stop limiter adjustment bolts. Findings published in COUNTERMEASURE. TACOM developed a quick check inspection to allow the operator to determine if vehicle steering stops were out of adjustment and published it in PS MAGAZINE.
1	¼-ton Truck M220A1 (Suspension System)	M220A1 Tow Jeep weapons system identified as operating in a 700-pound plus overloaded condition due to lack of improved suspension system and was identified as a cause factor in a fatal accident. Hazard Alert distributed to MACOM.

TABLE 4.—Significant Materiel Failures by Army Motor Vehicle System for Class A, B, and C Ground Accidents for 3 Fiscal Years —*Continued*

No. of Occurrences	Failed Part	Corrective Action
1	8-ton M520/GOER Steering	M520 series GOER (8-ton) experienced loss of steering control when engine quit due to clogged fuel filters causing a fatal accident. Problem identified a hydraulic steering system that was totally dependent on engine operation. Problem identified to TACOM for resolution. Action pending. Message sent to all field units advising operators not to allow engine to disconnect from train when engine quits in order to maintain steering control. Lack of rollover protection continues to produce fatal outcome during rollovers.
	¼-ton Truck Rollover/ Restraints (Design Deficiency)	Rollover/restraint protection in AMV is constantly addressed to DARCOM for resolution. Response on outfitting present vehicle inventory has been negative. Accident statistics continued to bear out need for rollover/constraint protection.

TABLE 5.—Significant Materiel Failures by Combat Vehicle System for Class A, B, and C Ground Accidents for 3 Fiscal Years

No. of Occurrences	Failed Part	Corrective Action
16	Other Carrier: Gunner's Seat, M901 ITV; Hatches (Design Deficiency)	M901 Improved Tow Vehicle (ITV) was identified as having a gunner seat that does not have adequate seat adjustment and as a result, unduly exposes the gunner from the groin area up during movement. TACOM is presently evaluating the seat design. Hazard Alert distributed to MACOM.
12	M113 Hatches	Inspection for serviceability and nonuse of safety pins on hatch latches is continually emphasized in COUNTERMEASURE publications. Supervisor level enforcement is key to prevention. Identification of alternative method of hatch latch has been recommended to TACOM.
10	M60 Tank Turret/ Weapon	The multitude of unprotected components (i.e., servo valves, fuel lines, electrical wires) is prime cause factor within the tight confines of the turret. Letter sent to TACOM to perform a hazard analysis on M60 tank turret to identify hazards that can be shrouded or protected to prevent accidents.
2	M109 Howitzer Accelerator Pedal (Design Deficiency)	M109 accelerator pedal was identified as an improper design due to a raised portion of the accelerator pedal being next to the brake system and was a direct cause of a fatal accident. Letter to TACOM and AMCCOM requesting evaluation of design. Action pending. Hazard Alert distributed to MACOM.
1	M48A5 Tank ECP Not Performed (Protective Wire Screen)	ECP not performed on tank (i.e., installation of a protective wire screen) resulted in fatal accident. TACOM advised; action pending. Hazard Alert distributed to all MACOM identifying problems.

Conclusions

Analysis of DA Form 285 accident reports for 3 fiscal years revealed the vehicles most frequently having materiel failures/malfunctions and the components most frequently involved were:

AMV

Tactical	Commercial
2½-ton trucks—brakes	sedans/station wagons--brakes, wheels
5-ton trucks—brakes	¼- - ¾-ton trucks—wheels
M880/M890 trucks--wheels	
¼-ton trucks—wheels, brakes	

ACV

M113 carriers—hatch/door assemblies
other carriers—hatch/door assemblies
M60 tanks—weapon system
Corrective actions included articles in *Countermeasure.*